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OCCUPATIONAL INJURIES AND DISEASES IN ALBERTA

Drilling of Oil and Gas Wells
1995 to 1999

Upstream Oil and Gas
Sub-Sector #4

Alberta
HUMAN RESOURCES
AND EMPLOYMENT

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TABLE OF CONTENTS

1. Introduction 2

2. Sub-Sector Description 3

3. Lost-Time Claim Rates and Duration Rates 5
  3.1 LTC Rates by Size of Employer: 1999 5

4. Analysis of the Lost-Time Claims 6
  4.1 Nature of Injury 6
  4.2 Type of Event/Exposure 7
  4.3 Part of Body Injured 8
  4.4 Source of Injury 9

5. Characteristics of the Injured Worker 11
  5.1 Occupation of the Injured Worker 11
  5.2 Age of injured Worker 12
  5.3 Length of Time Employed 12
  5.4 Gender of Injured Worker 12

6. Cost of Claims and Employer Premiums 13

7. Occupational Fatalities 14

8. OHS Investigated Occupational Fatalities: 1995-1999 16

Appendix A: Terms, Definitions, and Formulas 18

Appendix B: Upstream Oil and Gas 1999 Industry Codes 19

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1. Introduction

The Mission of Alberta Human Resources and Employment

One of the missions of Alberta Human Resources and Employment is to work in partnership with Albertans to promote safe and healthy workplace, a quality working life and comprehensive safety systems. To this end, Alberta Human Resources and Employment recognises that monitoring health and safety in Alberta will help to ensure primary workplace health and safety concerns are actively managed and prioritised, and resources directed where most needed.

This report summarises the lost-time injuries and disease descriptions, characteristics of the injured worker and the risk of injury to workers in Alberta's upstream oil and gas industries for the years 1995 to 1999. Cost of the injuries and revenue in terms of total premiums paid by employers. Finally, a summary of occupational fatalities accepted by the WCB for compensation and brief descriptions of fatalities investigated by Occupation Health and Safety are also provided.

The purpose of this report is to provide government, employers, workers and health and safety officers in upstream oil and gas industries with information about the industry key health and safety issues.

Description of Upstream Oil and Gas Industries

The upstream oil and gas industries can be subdivided into the following sub-sectors. Exploration, Oilfield Maintenance and Construction, Well Servicing with Service Rigs and Power Swivels, Drilling of Oil and Gas Wells, Oilfield Downhole and Other Services, Tar Sands, Petroleum Producers, and Oilfield Trucking Services.

The next section gives the descriptions of the Drilling of Oil and Gas Well sub-sector.

2. Sub-Sector Description

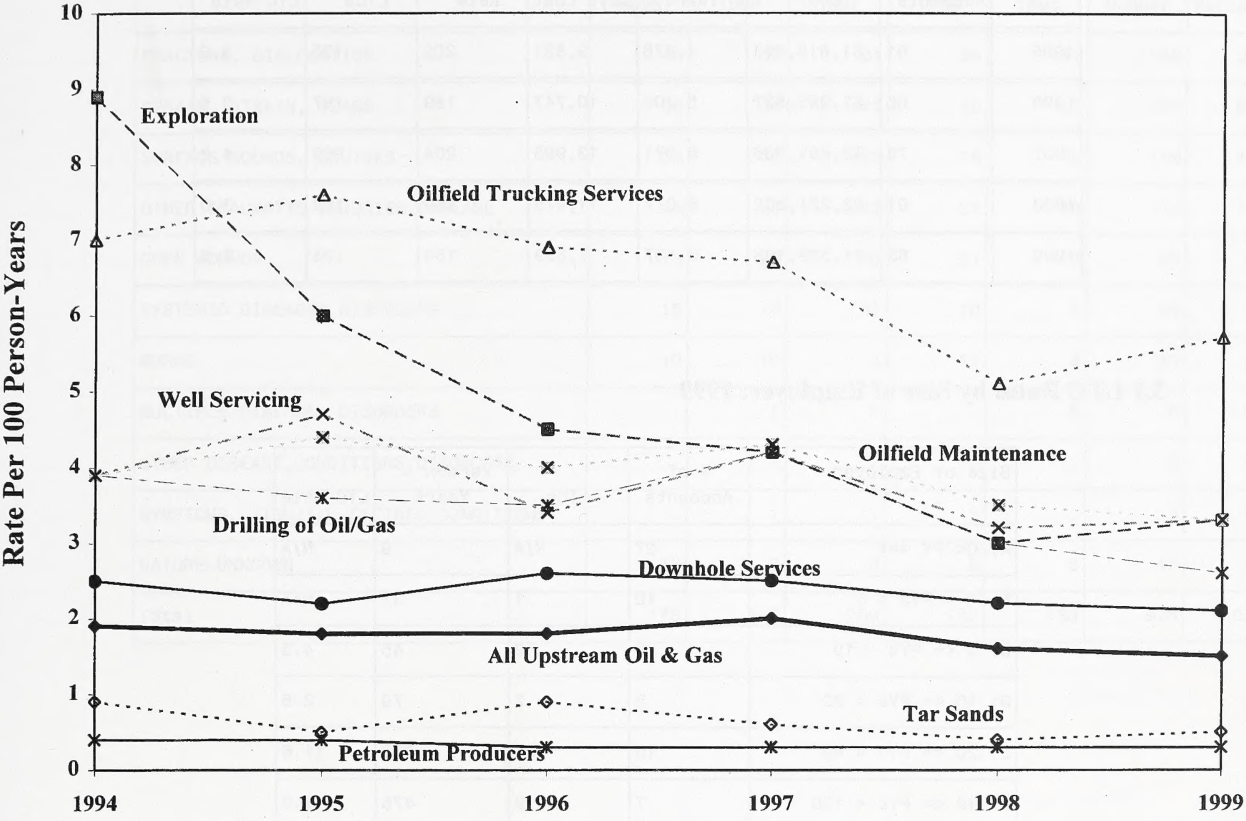
Sub-Sector # 4: Drilling of oil and gas wells

Drilling of oil and gas well (Industry # 9600)
Oil well drilling is performed by independent drilling companies contracted directly to oil companies. Oil companies will coordinate the drilling program and may provide on site direction and supervision, but do not become physically involved in operating the drilling rig.

The drilling of gas and oil wells is carried out by small crew, including a rig manager (tool push), driller, derrick hand, motor hand, floorhands (roughneck) and lease hands. Drilling can be round-the-clock operations using shift workers
The drilling of gas and oil wells involves the use of large heavy duty rigs or derricks that may be capable of drilling several thousand feet into the earth. The equipment is set up at a predetermined location an drilling commences for two to four weeks. Considerable time is spent setting up the equipment; however, this is considered part of the drilling operations. Also included is the activity of levelling the drilling rig. This involves the use of heavy hydraulic jacks (50 to 100 tons) to raise or lower the oil derrick prior to drilling. Heavy timbers are used to stabilize where necessary. Due to tremendous torque or twisting pressure exerted by the drill stem, it is necessary that the rig be level.

Blowout control and well fire fighting are also in this industry. The procedure necessary to cap a wildcat well varies. Sometimes a blowout can be brought under control by pumping mud or cement to stop the flow, or replacing valves on the blowout preventer. If a well catches fire, the fire must be extinguished before the well can be capped. A common method is to use explosives to cut off the fire's oxygen supply. Employers that are hired to set explosives for this purpose are covered in this industry.

Lost-Time Claim Rates
Upstream Oil & Gas Subsectors
Alberta: 1994-1999



3. Lost-Time Claim Rates and Duration Rates

09600-Drilling of Oil and Gas Wells

Year	# of Accounts	Cost	Person Years	Days Lost	Duration Rate	LTCs	LTC Rate
1995	61	$1,618,023	4,876	9,831	202	175	3.6
1996	66	$1,986,527	5,700	10,747	189	197	3.5
1997	79	$2,661,066	6,871	13,995	204	289	4.2
1998	81	$2,221,502	6,077	11,475	189	182	3.0
1999	83	$1,336,103	5,137	7,899	154	133	2.6

3.1 LTC Rates by Size of Employer: 1999

Size of Employer	# of Accounts	LTCs	Person - Years	LTC Rate
A: 0< PY <=1	27	N/A	9	N/A
B: 1 < PYs < 5	10	1	31	N/A
C: 5 <= PYs < 10	6	2	45	4.5
D: 10 <= PYs < 20	5	2	79	2.5
E: 20 <= PYs < 40	10	31	268	11.6
F: 40 <= PYs < 100	7	9	475	1.9
G: PYs >=100	11	88	4,231	2.1
H: Invalid	7	N/A	0	N/A
Total	83	133	5,137	2.6

4. Analysis of the Lost-Time Claims

4.1 Nature of Injury

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
FRACTURE, DISLOCATION	46	57	91	54	41	289	29.6
SPRAIN, STRAIN, TEARS	36	34	71	40	23	204	20.9
SURFACE WOUNDS, BRUISES	31	19	33	18	18	119	12.2
OTHER TRAUMATIC INJURIES/DISEASE	11	28	33	22	18	112	11.5
OPEN WOUNDS	13	22	20	21	13	89	9.1
SYSTEMIC DISEASES,DISORDERS	15	16	21	10	4	66	6.8
BURNS	10	10	8	11	2	41	4.2
MULTIPLE DISEASE, DISORDERS	.	1	1	.	6	8	0.8
OTHER DISEASE,CONDITIONS,DISORDERS	.	1	2	.	.	3	0.3
SYMPTOMS, SIGN/ILL-DEFINED CONDITIONS	.	1	.	1	.	2	0.2
NATURE-UNKNOWN	13	8	9	5	8	43	4.4
Total	175	197	289	182	133	976	100.0

4.2 Type of Event/Exposure

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
STRUCK BY OBJECTS	40	48	68	33	42	231	23.7
CAUGHT IN OBJECTS	28	28	48	44	23	171	17.5
OVEREXERTION	23	16	34	29	15	117	12.0
FALL TO LOWER LEVEL	19	20	39	18	11	107	11.0
FALL ON SAME LEVEL	13	12	23	12	15	75	7.7
EXPOSURE TO HARMFUL SUBSTANCES	13	16	11	16	4	60	6.1
BODILY REACTION	11	9	14	7	4	45	4.6
STRUCK AGAINST OBJECTS	2	6	8	5	1	22	2.3
TRANSPORTATION ACCIDENTS	5	2	5	2	5	19	1.9
REPETITIVE MOTIONS	.	5	6	4	1	16	1.6
OTHER FALLS	.	1	7	2	4	14	1.4
RUBBED OR ABRADED	2	2	.	.	1	5	0.5
OTHER BODILY REACTION/EXERTION	.	1	2	.	.	3	0.3
OTHER ASSAULTS/VIOLENT ACTS	1	.	1	.	.	2	0.2
ASSAULTS/VIOLENT ACTS BY PERSONS	.	.	.	1	.	1	0.1
FIRES AND EXPLOSIONS	.	.	1	.	.	1	0.1
OTHER CONTACT WITH OBJECT/EQUIP	.	.	.	1	.	1	0.1
UNKNOWN	18	31	22	8	7	86	8.8
Total	175	197	289	182	133	976	100.0

4.3 Part of Body Injured

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
BACK	29	36	50	32	19	166	17.0
FINGER(S)	26	32	34	34	23	149	15.3
ANKLE(S) & FOOT(FEET)-NOT TOES	18	25	43	24	17	127	13.0
OTHER TRUNK	22	23	37	19	15	116	11.9
LEG(S)	21	17	33	16	10	97	9.9
WRIST(S)/HAND(S)	16	18	24	12	5	75	7.7
OTHER UPPER EXTREMITIES	13	10	26	13	12	74	7.6
OTHER HEAD	7	11	16	12	14	60	6.1
MULTIPLE BODY PARTS	10	7	8	7	11	43	4.4
OTHER LOWER EXTREMITIES	7	11	5	6	4	33	3.4
EYE(S)	4	3	2	4	2	15	1.5
NECK	1	2	5	3	1	12	1.2
BODY SYSTEMS	1	2	4	.	.	7	0.7
UNKNOWN	.	.	2	.	.	2	0.2
Total	175	197	289	182	133	976	100.0

4.4 Source of Injury

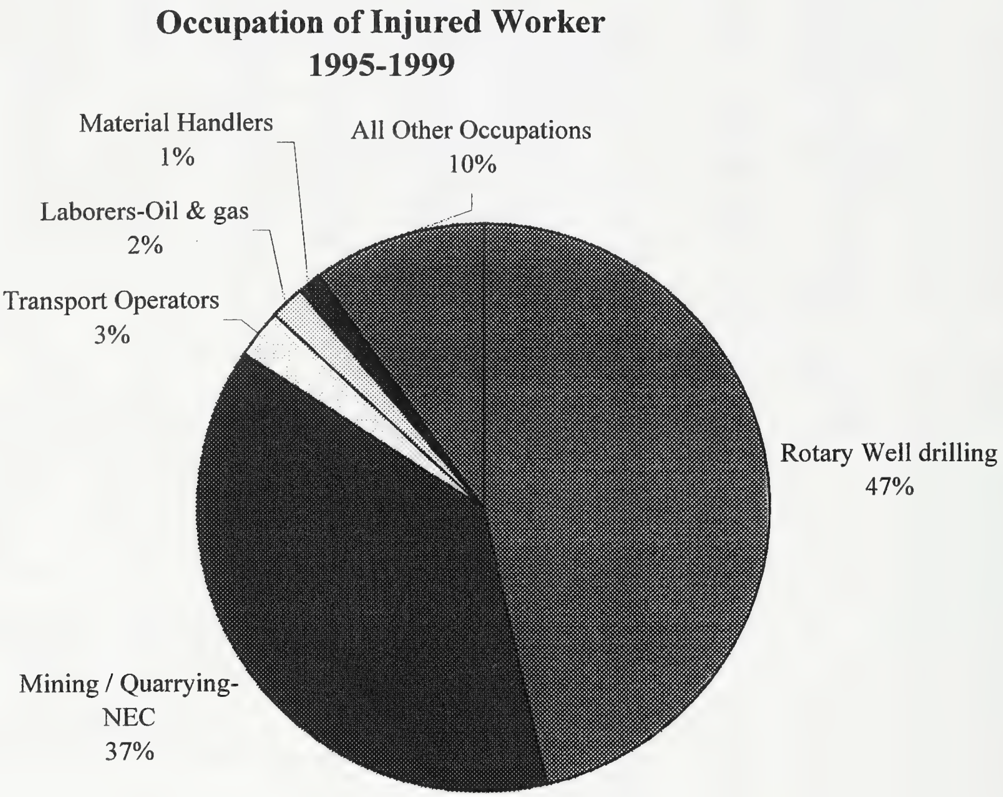
LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
PARTS AND MATERIALS	35	42	59	40	30	206	21.1
STRUCTURES/SURFACES	23	20	51	27	14	135	13.8
MACHINERY	16	11	27	18	15	87	8.9
PERSONS-INJURED WORKER	10	16	22	11	5	64	6.6
HANDTOOLS-UNPOWERED	3	13	20	12	10	58	5.9
OTHER SOURCES	20	10	5	11	7	53	5.4
CONTAINERS	7	8	9	7	10	41	4.2
VEHICLES	6	3	5	2	5	21	2.2
OTHER TOOLS/EQUIPMENTS	.	3	6	4	7	20	2.0
CHEMICAL/CHEMICAL PRODUCTS	3	6	5	3	.	17	1.7
FURNITURE AND FIXTURES	2	1	2	.	1	6	0.6
HANDTOOLS-POWERED	1	.	1	1	.	3	0.3
OTHER PLANTS/ANIMALS/MINERALS	1	.	1	1	.	3	0.3
PERSONS-OTHER THAN INJURED WORKER	1	1	.	1	.	3	0.3
MINERALS-METALS/NONMETALLIC	.	1	1	.	.	2	0.2
UNKNOWN	47	62	75	44	29	257	26.3
Total	175	197	289	182	133	976	100.0

4.5 Duration of Disability

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: 01 Day	6	4	9	4	.	23	2.4
B: 02 Days	3	2	7	3	2	17	1.7
C: 03 - 05 Days	4	8	15	9	4	40	4.1
D: 06 - 10 Days	14	14	31	10	12	81	8.3
E: 11 - 20 Days	18	26	29	23	16	112	11.5
F: 21 - 30 Days	16	19	24	14	11	84	8.6
G: 31 Days OR More	94	103	130	92	78	497	50.9
H: Unspecified	20	21	44	27	10	122	12.5
Total	175	197	289	182	133	976	100.0

5. Characteristics of the Injured Worker

5.1 Occupation of the Injured Worker



5.2 Age of injured Worker

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: 15 - 19 Years	11	10	19	9	5	54	5.5
B: 20 - 24 Years	37	40	73	42	31	223	22.8
C: 25 - 34 Years	80	93	118	76	52	419	42.9
D: 35 - 44 Years	37	46	71	43	37	234	24.0
E: 45 - 54 Years	7	4	5	7	6	29	3.0
F: 55+ Years	2	3	3	5	2	15	1.5
G: Unspecified	1	1	.	.	.	2	0.2
Total	175	197	289	182	133	976	100.0

5.3 Length of Time Employed

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
A: LESS THAN 1 MONTH	35	41	68	27	24	195	20.0
B: 1 MONTH TO < 6 MONTHS	47	45	84	34	22	232	23.8
C: 6 MONTHS TO < 1 YEAR	20	22	21	20	6	89	9.1
D: 1 YEAR OR MORE	39	31	40	25	38	173	17.7
E: TIME UNSPECIFIED	34	58	76	76	43	287	29.4
Total	175	197	289	182	133	976	100.0

5.4 Gender of Injured Worker

LOST-TIME CLAIMS ALBERTA: 1995 TO 1999	OCCURRENCE YEAR					Total	
	1995	1996	1997	1998	1999	Number	Percent
MALES	174	193	283	179	130	959	98.3
FEMALES	1	2	2	1	2	8	0.8
UNSPECIFIED	.	2	4	2	1	9	0.9
Total	175	197	289	182	133	976	100.0

6. Cost of Claims and Employer Premiums

Sub-Sector 4- Drilling of Oil & Gas Wells

	OCCURRENCE YEAR				
	1995	**1996**	**1997**	**1998**	**1999**
TRANSACTION YEAR					
1995	$1,474,192				
1996	$890,463	$1,566,540			
1997	$448,407	$1,536,088	$2,290,186		
1998	$814,554	$939,346	$2,161,716	$1,785,722	
1999	$777,926	$1,047,934	$2,988,285	$1,524,958	$1,376,298
Total Cost	$4,405,541	$5,089,908	$7,440,187	$3,310,680	$1,376,298
Total Premiums	$11,932,658	$10,261,045	$13,643,945	$8,035,559	$5,670,389

The above claim cost and employer premiums are for the five-year period 1995 through 1999. The data is as at July 5, 2000.

The cost of claim amount reflects only paid cost on claims that have occurred in the five-year period. The claim costs are tracked by occurrence year and the year that the costs were transacted.

The premiums are the total of all premiums paid by employers in each year.

7. Occupational Fatalities

An occupational fatality is the death of a worker that results from a work-related incident or exposure. Alberta Human Resources and Employment classifies occupational fatalities into three general types: motor vehicle incident, workplace incident and occupational diseases. Each is described in detail below.

Motor Vehicle Incident

Motor vehicle incidents typically involve highway vehicles operating on public roads in which the fatally injured worker was either the driver or a passenger. This category also includes fatalities involving aircraft crashes, train crashes, helicopter crashes, etc.

Workplace Incident

Fatal workplace incidents consist of cases in which the worker dies at a work site, or as a result of injuries sustained at a work site. It is this type of fatality that Alberta Human Resources and Employment may be responsible for investigating.

Occupational Diseases

Occupational disease fatalities consist mostly of recognized occupational disease, that is, disease known to be primarily or exclusively work-related (e.g. asbestosis, black lung disease). Occupational diseases are frequently diagnosed many years after the initial or crucial exposure to the toxic substance, and in such cases it is very difficult to determine when the fatal exposure occurred. Thus, the occupational disease category should not be interpreted to reflect present work site hazardous conditions or exposures.

Each year the Workers' Compensation Board (WCB) accepts some occupational fatality claims for compensation. Occupational fatality claims that were accepted in a particular year may include fatalities from prior years.

Description of Drilling of Oil/Gas Wells Workplace Fatalities
Accepted by the WCB
Alberta: 1995-1999

Year	Occupational Disease		Motor Vehicle incident		Workplace Incident		Total	
	N	%	N	%	N	%	N	%
1995	0	0.0	0	0.0	2	100.0	2	100
1996	0	0.0	0	0.0	2	100.0	2	100
1997	0	0.0	1	33.3	2	66.7	3	100
1998	0	0.0	1	100.0	0	0.0	1	100
1999	0	0.0	0	0.0	1	100.0	1	100
Total	0	0.0	2	22.2	7	77.8	9	100

8. OHS Investigated Occupational Fatalities: 1995-1999

YEAR: 1995 FILE: 0803
OCCUPATION: Derrickman AGE: 39
INDUSTRY: Drilling of Oil & Gas Wells
EXPERIENCE: 21 years

DESCRIPTION: A worker was fatally injured as a result of a derrick collapse on a drilling rig at a well lease. The worker had just climbed to the crown of the derrick to assist with setting up the structure. the two front legs attached to the floor buckled while the two back legs attached to the stools on the drawworks skid bent and snapped off. The derrickman was still attached to a fall arrester at the crown. The worker succumbed to the serious injuries he received from the impact of the fall.

YEAR: 1995 FILE: 0822
OCCUPATION: Floor Hand AGE: 33
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE: Unknown

DESCRIPTION: The drilling crew was in the process of doing a drill stem test and had attempted to inflate the packers, but they would not inflate. The decision was made to rotate the drill string at an increased speed, for an additional 15-20 minutes. During this procedure the floor personnel had been instructed to >clear the floor= which meant that workers were not be within a specific area of the rig floor.

The crew was approaching the end of a 12 hour shift, and the normal duties performed by the crew in the last hour of the shift is to clean the rig and have it ready for the next crew. The injured worker was washing the rig floor using a steam hose. The hose became tangled with the breakout tool cable and the rotating drill string and pulled the worker into the drill string, with the hose and cable being wrapped around the worker as the drill string rotated. The hose and cable continued to tighten as the pipe rotated, crushing the floor hand.

YEAR: 1996 FILE: 0845
OCCUPATION: Floor hand - Oil Well Drilling AGE: 25
INDUSTRY: Drilling Oil & Gas Wells
EXPERIENCE: Unspecified

DESCRIPTION: A crew was in the process of drilling a well. In the process of making a connection, adding a length of pipe to the drilling string, the hammer nut on the swivel caught a horizontal beam on the crown stand. This caused the bottom end of the pipe to whip toward the back of the rig floor. The floor hand was unable to move out of the way and was struck in the face and chest, and was thrown about 2.5 metres where his head contacted racked pipe. This resulted in fatal injuries to the floor hand.

YEAR: 1996 FILE: 0846
OCCUPATION: Floor hand - Oil Well Drilling AGE: 31
INDUSTRY: Drilling Oil & Gas Wells
EXPERIENCE: 287 hours, total rig experience, 72 hours as a floor hand

DESCRIPTION: A crew was preparing a rig for a move at the time of the incident, by removing and storing pipe from the well. While raising a length of pipe so it could be uncoupled, the break-out tong of the floor man caught on the pipe, rising along with it. The floor hand was caught by the safety cables and pinned against the structure of the rig, causing fatal injuries.

YEAR: 1997 FILE: 0862
OCCUPATION: Floor Hand AGE: 20
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE: Less than one year

DESCRIPTION: The drilling crew was in the process of tripping out drill pipe, when they came to a set of cross over subs. These subs are used to adapt parts of the drilling string which cannot otherwise be screwed together because of the difference in thread size or design. The crew attached the tongs to the collars and sub and applied torque to break open the joint between the two. The lead tong (tongs are the large wrenches that are latched onto drill pipe or drill collars in order to make up "tighten" or break out "loosen" joint or drill pipe or drill collars) latch lug jaw failed, broke off, and struck the worker in the head fatally injuring him.

YEAR: 1997 FILE: 0877
OCCUPATION: Floorhand AGE: 22
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE:

DESCRIPTION: An oil rig crew was finishing the process of laying down an oil rig derrick on two bedtrucks in preparation for the rig move. The worker assisted a gin pole truck operator in rigging the A-leg section of a mast so a spreader bar could be removed and the A-leg lowered. The A-leg was secured to a lifting lug which was attached to a hook and winch line of a gin pole truck. The worker removed a pin that secured a spreader bar to the derrick and then climbed onto the derrick to remove the spreader bar. The worker polled the spreader bar off, lost his balance and fell forward under the suspended A-leg. Simultaneously, the lifting lug used in lowering and raising the A-legs failed. The A-leg fell on the worker, causing fatal injuries.

YEAR: 1999 FILE: 0918
OCCUPATION: Lease Hand AGE: 25
INDUSTRY: Drilling of Oil and Gas Wells
EXPERIENCE: 39 months on rigs / 69 days on Rig #159SL

DESCRIPTION: The worker was resetting the pipe handling system at the drill rig. To facilitate the pipe transfer process, the transfer arm was to be repositioned to the next tier of drill pipes. A drill pipe, left from the previous transferred layer, was resting on the transfer arm. The worker lost control of the transfer arm when he attempted to resposition it. The drill pipe resting on the transfer arm rolled down and struck the worker on the head. The worker died from serious head injuries.

Appendix A: Terms, Definitions, and Formulas

Lost-Time Claim	A lost-time claim (LTC) is a claim for an occupational injury or disease which disables the worker beyond the day of injury. Included are claims for which wages compensation are paid, permanent disability claims, fatalities, and cases in which the injured worker is assigned light duties or other modified work.
Person-Years	Person-year estimates are calculated from wage and payroll data provided by account holders to the WCB. Alberta Labour uses these data to estimate. An average industry wage, and uses the average industry wage and employer payroll data to estimate person-years foe each employer and each industry. One person-year ie equivalent to one full-time worker working for one year, and can be assumed to equal 2,000 hours worked.
LTC Rate	The lost-time claim (LTC) rate is calculated by dividing the number of lost-time claims by the person-year estimate, and multiplying the result by 100. The LTC rate represent the probability or risk of disabling injury or disease to a worker during a period of one year's work. Comparisons of LTC rates between industries, or between years, can be used to indicate increases, decreases, or differences in this risk. $\text{LTC Rate} = \frac{\text{Number of LTCs X 100}}{\text{Estimated Person-years}}$
Duration (Days Lost)	The duration of disability is the number of days following the injury or disease for which the worker was disabled, and unable to perform normal work duties. This information is obtained for this report from data on compensation days paid on each claim from WCB. Alberta Labour obtains these data on March 31 of the year following the claim year, and does not update the information, even though many injured workers continue to be disabled beyond this date. As a result, the duration information reported here underestimates the true impact of lost-time injury and disease.
Duration Rate	The duration rate is calculated by dividing the number of work days lost (disability days) by the person-year estimate, and multiplying by 100. The result is expressed as "days lost per 100 person-years worked", and indicates, in part, the economic impact of occupational injury and disease. Duration rates are not recommended as reliable indicators of full economic cost. In addition, readers are warned that duration rates are highly unstable when based on only a few lost-time claims; it is recommended that the duration rate not be calculated based upon fewer than 30 lost-time claims. $\text{Duration Rate} = \frac{\text{Disability Days X 100}}{\text{Estimated Person-Years}}$
WCB Accepted Fatality	An occupational fatality is the death of a worker which result from a work-related incident or exposure and which has been accepted by the WCB for compensation. A fatality is counted in the year it is accepted.
NEC	Means "Not Elsewhere Classified"
UNS	Means "Unspecified"

Appendix B: Upstream Oil and Gas 1999 Industry Codes

Sub-Sector 1: **Exploration**
Industries: 09200~Seismic Geophysical/Mineral Exploration
09201~Shot Hole Drilling

Sub-Sector 2: **Oilfield Maintenance and Construction**
Industries: 06304~Oilfield Construction and/or Maintenance

Sub-Sector 3: **Well Servicing With Service Rigs**
Industries: 09903~Well servicing with Service Rigs including Power Swivels

Sub-Sector 4: **Drilling of Oil and gas Wells**
Industries: 09600~Drilling of Oil & Gas Wells

Sub-Sector 5: **Downhole & Other Oilfield Services**
Industries 06305~Field Production Operators
06306~Vacuum Removal of Waste
09900~Mud Logging
09902~Pressure Cleaning Services
09904~Rathole Drilling and Rig Anchoring
09911~Oilfield Downhole Services
09915~Well Casing Services
09921~Servicing Christmas Trees On Oil Wells
09927~Liquid Waste Treatment & Disposal

Sub-Sector 6: **Tar Sands**
Industries: 06600~Mining & Processing of Bituminous Sand
06601~Research/Development, Oil Sands and Heavy Oil Recovery

Sub-Sector 7: **Oil & Gas Exploration/Development**
Industries: 06300~Oil and Gas Exploration & Development-Upstream Operations

Sub-Sector 8: **Oilfield Trucking Services**
Industries: 50720~Oilfield Trucking Services

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